

CLASSIFICATION

CONFIDENTIAL

CONFIDENTIAL

CENTRAL INTELLIGENCE AGENCY

REPORT

50X1-HUM

INFORMATION FROM  
FOREIGN DOCUMENTS OR RADIO BROADCASTS CD NO.

COUNTRY USSR

DATE OF  
INFORMATION 1948

SUBJECT Scientific - Geophysics

HOW  
PUBLISHED Book

DATE DIST. 29 Nov 1949

WHERE  
PUBLISHED Moscow

NO. OF PAGES 4

DATE  
PUBLISHED 1948

LANGUAGE Russian

SUPPLEMENT TO  
REPORT NO.

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE  
OF THE UNITED STATES WITHIN THE MEANING OF ESPIONAGE ACT 50  
U. S. C. 91 AND 92, AS AMENDED. ITS TRANSMISSION OR THE REVELATION  
OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PRO-  
HIBITED BY LAW. REPRODUCTION OF THIS FORM IS PROHIBITED.

THIS IS UNEVALUATED INFORMATION

SOURCE

Solnechnaya Aktivnost' i yeye Zemnyye Proyarleniya, OGIZ (State Publishers  
of Technical and Theoretical Literature), [redacted]

50X1-HUM

TABLE OF CONTENTS FOR  
"SOLAR ACTIVITY AND ITS TERRESTRIAL MANIFESTATIONS"

M. S. Rygenson, M. N. Gnevyshev,  
A. I. Ol', B. M. Rubashev  
Edited by M. S. Rygenson

50X1-HUM

TABLE OF CONTENTS

	<u>Page</u>
Foreword	6
Introduction	7
Part 1. Solar Activity	
Chapter I. Forms of Solar Activity	
Section 1. General Knowledge about the Sun	11
2. Photospheric formation	15
3. Chromospheric Formation	20
4. Solar Corona	23
5. Indices of Solar Activity	29
6. The Duty of the Sun	33
Chapter II. Cyclic Variations in Solar Activity	
Section 1. Solar Cyclicity; Schwabe-Wolf Law	36
2. Laws of Latitudinal Distribution of Solar Activity; Sporer's Law	40

- 1 -

CLASSIFICATION

CONFIDENTIAL

STATE	<input checked="" type="checkbox"/>	NAVY	<input checked="" type="checkbox"/>	NSRB		DISTRIBUTION							
ARMY	<input checked="" type="checkbox"/>	AIR	<input checked="" type="checkbox"/>	FBI									

50X1-HUM

CONFIDENTIAL

	<u>Page</u>
3. Analysis of the Cyclic Curve	44
4. Comparison of the Activities of the Solar Hemispheres during an 11-Year Cycle	47
5. Duration of Sunspot Groups and Phase of 11-Year Cycle	49
6. Curves Showing the Time Distribution of Sunspots and "Filaments"	53
7. Connection between Cycles	55
8. Fluctuations in Solar Activity with Durations Greater than 23 Years	59
 Chapter III. Pulses in Solar Activity	
Section 1. Longitudinal Distribution of Sunspots	61
2. Interconnection between Various Solar Phenomena	66
3. Concept of Pulses in Solar Activity	68
4. Variations in the Characteristics of Separate Solar Phenomena during Pulses in Solar Activity	69
5. Vortical Motions in Active Regions	74
6. Physical Structure of Active Regions	76
7. The Problem of the Existence of Active Longitudes	80
 Chapter IV. Geo-activity of the Sun	
Section 1. Emission of Eruptions	84
2. Determination of the Magnitude of Relative Excess of Ultraviolet Radiation in the Active Regions, on the Basis of Stroemer's Theory	85
3. Pulkovo Index of Ultraviolet Radiation	90
4. Emission of the Active Regions of the Sun in the Region of Radio Frequencies	92
5. Astronomical Data Indicating the Presence of a Current of Solar Corpuscles	93
6. Geophysical Data Indicating the Presence of a Current of Solar Corpuscles	95
 Part 2. Solar Activity and Processes in the Ionosphere	
Chapter I. Nondisturbed Ionosphere	
Section 1. Nondisturbed Solar Radiation and its Ionizing Activity	101
2. Ionization-Recombination Equation, Its Solution and Consequences	103
3. Experimental Data	109
4. Results of Ionospheric Observations during Solar Eclipses	115
5. Conditions Governing Radio Communication on a Normal Day	117
 Chapter II. Disturbances of the Ionosphere Caused by the Intensification of the Intensity of Solar Ultraviolet Radiation	
Section 1. The 11-Year Behavior of Critical Frequencies	121
2. Comparison of Ionospheric and Solar Data for Small Intervals of Averaging	126

- 2 -

CONFIDENTIAL

CONFIDENTIAL

**CONFIDENTIAL**

50X1-HUM

CONFIDENTIAL

3. Dellinger's Effect	128
4. Geomagnetic Phenomena Accompanying Dellinger's Effect	132
5. Attempts to Interpret Dellinger's Effect	136
Chapter III. Disturbances of the Ionosphere, Caused by the Interaction of the Sun's Corpuscular Radiation	
Section 1. Latitudinal Distribution of the Deviations of the Critical Frequencies of Layer F <sub>2</sub> from the Normal Values	140
2. Variations in the Ionosphere during Magnetic Storms	145
3. Sporadic Layer in the Ionosphere	146
4. Variations in the Conditions Governing Radio Communication during the Action of Corpuscular Flow	150
5. Conclusions	154
Part 3. Solar Activity and Terrestrial Magnetism	
Chapter I. Variations in the Geomagnetic Field, Caused by Nondisturbed Solar Radiation	
Section 1. General Information about the Earth's Magnetic Field	156
2. Solar-diurnal and Lunar-diurnal Variations	160
3. Influence of the 11-Year Cycle of Solar Activity upon the Diurnal Variation of the Geomagnetic Field	162
4. Vector Diagram of the Diurnal Variations	164
5. Changes in the Amplitude of Variation from Day to Day	165
6. Dellinger's Effect and Diurnal Variations in the Earth's Magnetic Field	167
7. Theories of Diurnal Variations	167
Chapter II. Variations in the Geomagnetic Field Caused by Solar Activity	
Section 1. Types of Magnetic Disturbances	171
2. Fundamental Characteristics of Magnetic Storms	173
3. Indexes of Disturbances in a Geomagnetic Field	178
4. Connection of the Mean Annual Values of Magnetic Disturbances with the 11-Year Cycle of Solar Activity	183
5. Connection of the Magnetic Disturbance with the Solar Activity for Intervals Averaging Less than a Year	186
6. Individual Comparisons of Magnetic Disturbances with Various Elements of Solar Activity	190
7. The 27-Day Recurrence of Magnetic Disturbances	199
8. Geomagnetic Disturbances and Pulse of Solar Activity	209
Chapter III. Theory of Magnetic Storms	
Section 1. Birkland-Stoermer Theory	212
2. Chapman-Ferraro Theory	218
3. Alfvén's Theory	221
4. Ultraviolet Theory of Magnetic Storms	223

CONFIDENTIAL

50X1-HUM

CONFIDENTIAL

Page

## Chapter IV. New Data Concerning the Nature of Geomagnetic Disturbances

Section 1. Solid Angle of Corpuscular Radiation of the Sun	225
2. Diurnal Course of Geomagnetic Disturbances	230
3. Connection between Magnetic Disturbance and the Absolute Values of Geomagnetic Elements	235
4. The Reality of Storm-Time Variation	237
5. World Storms and Polar Storms	238
6. The Annual Course of Magnetic Disturbance	240
7. The Nature of Corpuscular Radiation of the Sun	246
8. Conclusions on Part 3	257

## Part 4. Connection of Solar Activity with Phenomena in the Troposphere

## Chapter I. The Possibility of the Influence of Solar Activity upon Processes in the Troposphere

Section 1. The Reality of Fluctuation in Integral Solar Radiation and the Possibility of their Influence upon Tropospheric Processes	261
2. The Possibility of the Influence, upon the Troposphere, of Fluctuations in the Intensity of Radiation in Separate Parts of the Spectrum and of the Corpuscular Current from the Sun	263
3. Atmospheric Ozone and its Connection with the Hothouse Effect	264
4. Atmospheric Ozone and Solar Activity	266
5. Comparisons of Separate Meteorological Elements with Solar Activity	274

## Chapter II. Physicochemical Processes in the Terrestrial Atmosphere and Their Connection with Solar Activity

Section 1. The Atmosphere as a Colloid. The Physicochemical Factor as an Addition to Thermodynamic Conditions	282
2. Condensation Mechanism of the Action of Fluctuations in Solar Activity upon Processes in the Lower Layers of the Earth's Atmosphere	285
3. Connection of Cloudiness and Precipitation with Solar Activity	288

## Chapter III. New Works on the Problem of Sun and Troposphere

Section 1. The Reflection Method	294
2. The Results of Applying the Reflection Method to Arctic Disturbances	298
3. The Connection of Seasonal Processes with Solar Activity	305
4. Results of Applying the Reflection Method to a Study of Azores Disturbances	307
Bibliography (411 Sources)	314

- E N D -

- 4 -

CONFIDENTIAL

CONFIDENTIAL